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ABSTRACT

In this study, the effects of two kinds of letter formation practice and a form of letter discrimination training on the handwriting performance of approximately fifty kindergarten children were investigated. After being pretested, subjects were randomly assigned to the following four treatment groups: (1) copying only, (2) faded tracing only, (3) copying and letter discrimination training, and (4) faded tracing and letter discrimination training. After ten weeks of instruction, it was found that the letter formation behavior of all groups had improved significantly. However, subjects who had received copying exercises performed significantly better than those who had received faded tracing exercises. Letter discrimination training had no effect on letter formation performance. Implications for future program development are discussed. (Author)

SOUTHWEST REGIONAL LABORATORY
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NO TM 3-72-01

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THE EFFECTS OF TRACING PROMPTS AND DISCRIMINATION TRAINING ON KINDERGARTEN HANDWRITING PERFORMANCE

Edward Hirsch and Fred C. Niedermeyer

Handwriting instruction is an essential component of a comprehensive communication skills program. This report describes an experiment conducted during the Spring of 1971 to determine the effects of two instructional variables on the manuscript handwriting performance of kindergarten children. The study was designed to provide information to be used in formulating a teacher-administered handwriting program at the kindergarten or first-grade levels.

The need for an empirical investigation into possible methods of teaching handwriting became apparent when reviewing existing instructional practices and research reports. Groff (1960), for example, reported a survey of opinions of directors of elementary education in 72 metropolitan areas which revealed that the choice of methods used to teach handwriting is based on public opinion rather than research evidence. Anderson (1965), in his analysis of Herrick's (1961) comprehensive handwriting bibliography, reported that over 70 percent of the articles cited are of a non-technical, descriptive nature. An inspection of a relatively recent article reviewing the last decade's research in handwriting (Askov, Otto, and Askov, 1970) revealed few empirical studies which offered specific suggestions for the design of a teacher-administered instructional program for manuscript printing at the primary grade level.

TREATMENT CONDITIONS

In this study two variables were investigated to determine their effects on the manuscript handwriting performance of kindergarten children. The two variables, type of letter formation practice (copying and faded tracing) and letter discrimination training (its presence and absence), were selected because instructional theory tends to support their relevance to the teaching of handwriting.

COPYING VERSUS FADED TRACING

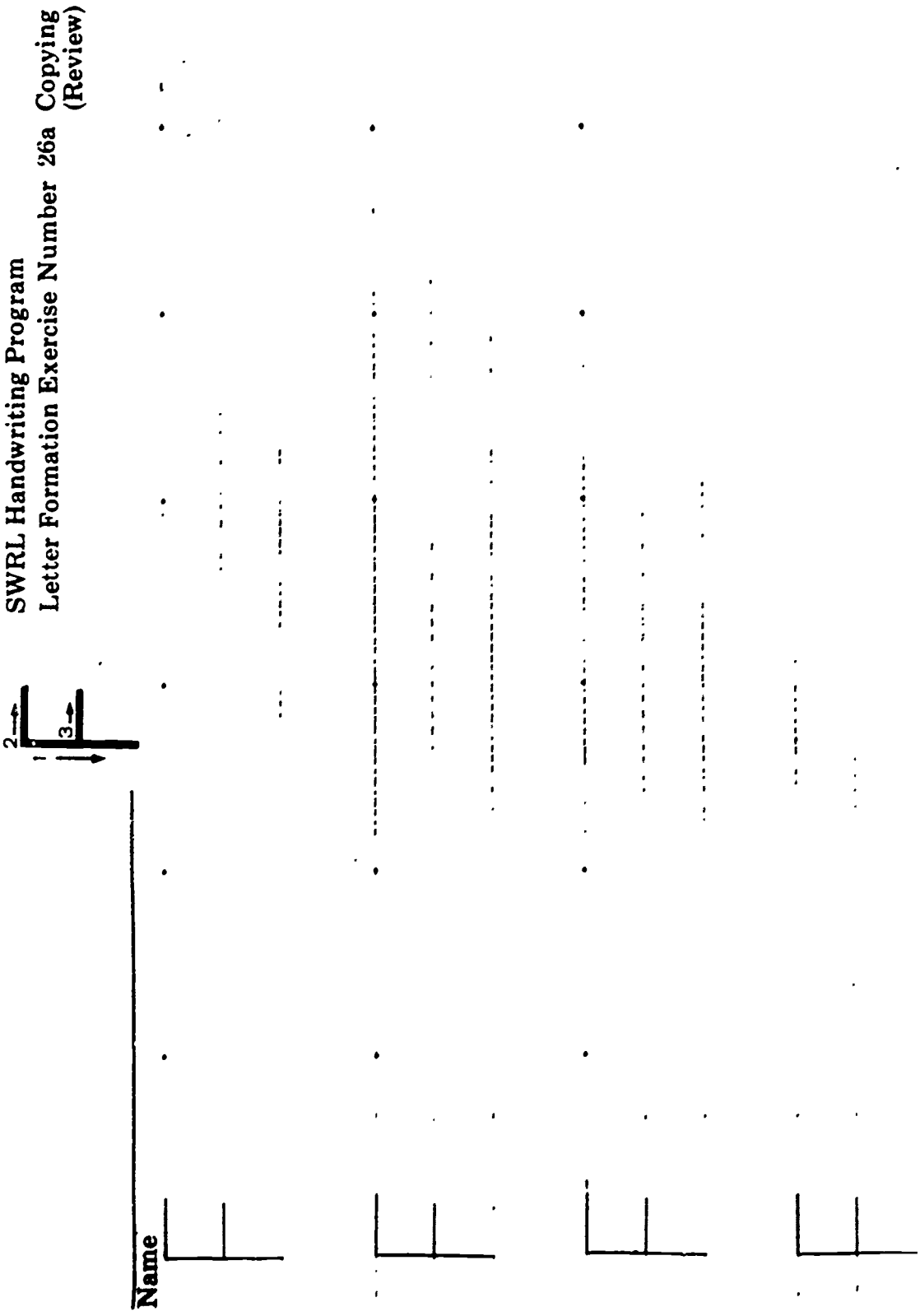
Most children learn to print by copying letters that have been placed at the front of the classroom, on ditto sheets, or in handwriting texts such as those adopted in California (Noble & Noble, 1967). Stimulus-response theory, however, suggests that a more effective method of learning to print might involve tracing the letter initially, with tracing prompts gradually being faded until the child is eventually copying the letter. This process involves a transfer of stimulus control and has been employed extensively to teach a variety of behaviors. Unfortunately, no reports were found of studies applying this process to the teaching of handwriting.

To compare the instructional efficacy of the copying method versus the faded tracing approach, two types of letter formation exercises were developed for use by kindergarten children. The worksheets for the traditional copying treatment simply had the children copy each new letter 24 times. (See Figure 1 for a sample copying exercise.) In the faded tracing worksheets, however, the child began by tracing a dotted representation of the letter several times. The dots were

Figure 1

Sample Copying Exercise

(Reduced)



then gradually faded so that by the eighteenth response, the child was finally copying the entire letter on his own. A backward fading technique was used in the construction of these exercises. That is, dots representing the last stroke were removed first, followed by the dots representing each of the preceding strokes. (See Figure 2 for a sample faded tracing exercise.)

LETTER DISCRIMINATION TRAINING

Another factor which may affect handwriting performance involves the child's ability to discriminate between correctly and incorrectly printed letters. Since model letters are always used as stimuli in handwriting instruction, it might be assumed that discrimination training on letter forms would facilitate learning the handwriting task. While empirical evidence regarding this assumption is contradictory and scant (Birch and Lefford, 1967), further study was needed simply because most teachers believe that discrimination training is necessary (just as the many school practitioners assume auditory discrimination training is important to reading or speech articulation).

To determine the extent to which discrimination training promotes handwriting ability, exercises providing practice on this task were developed. In the letter discrimination exercises, the child was required to identify and circle, from a set of six letters, the ones that matched a model letter. Each distractor differed from the model letter in at least one way: height, width, alignment, orientation, or rotation. (A sample letter discrimination exercise appears as Figure 3.)

Figure 2

Sample Faded Tracing Exercise

(Reduced)

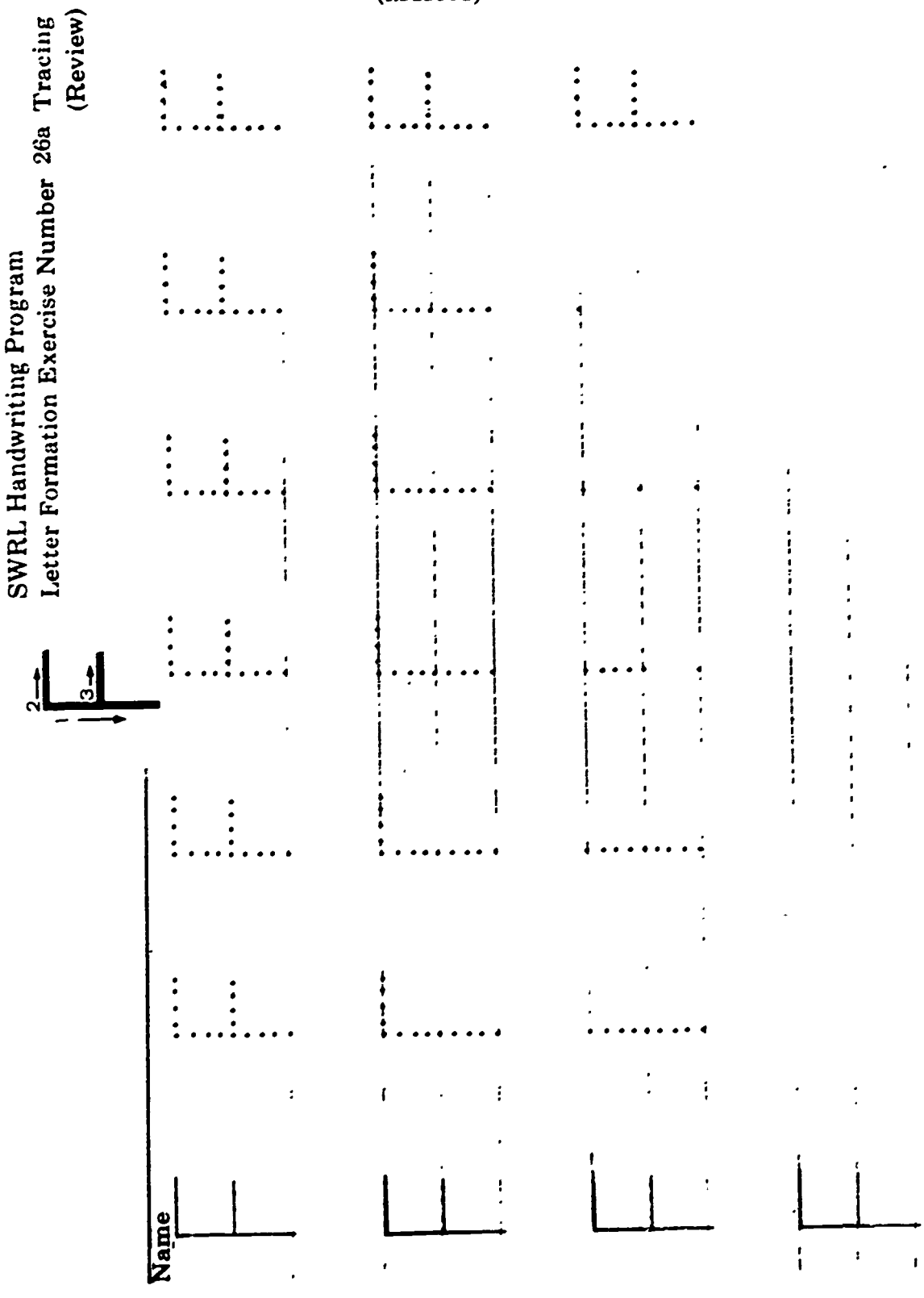
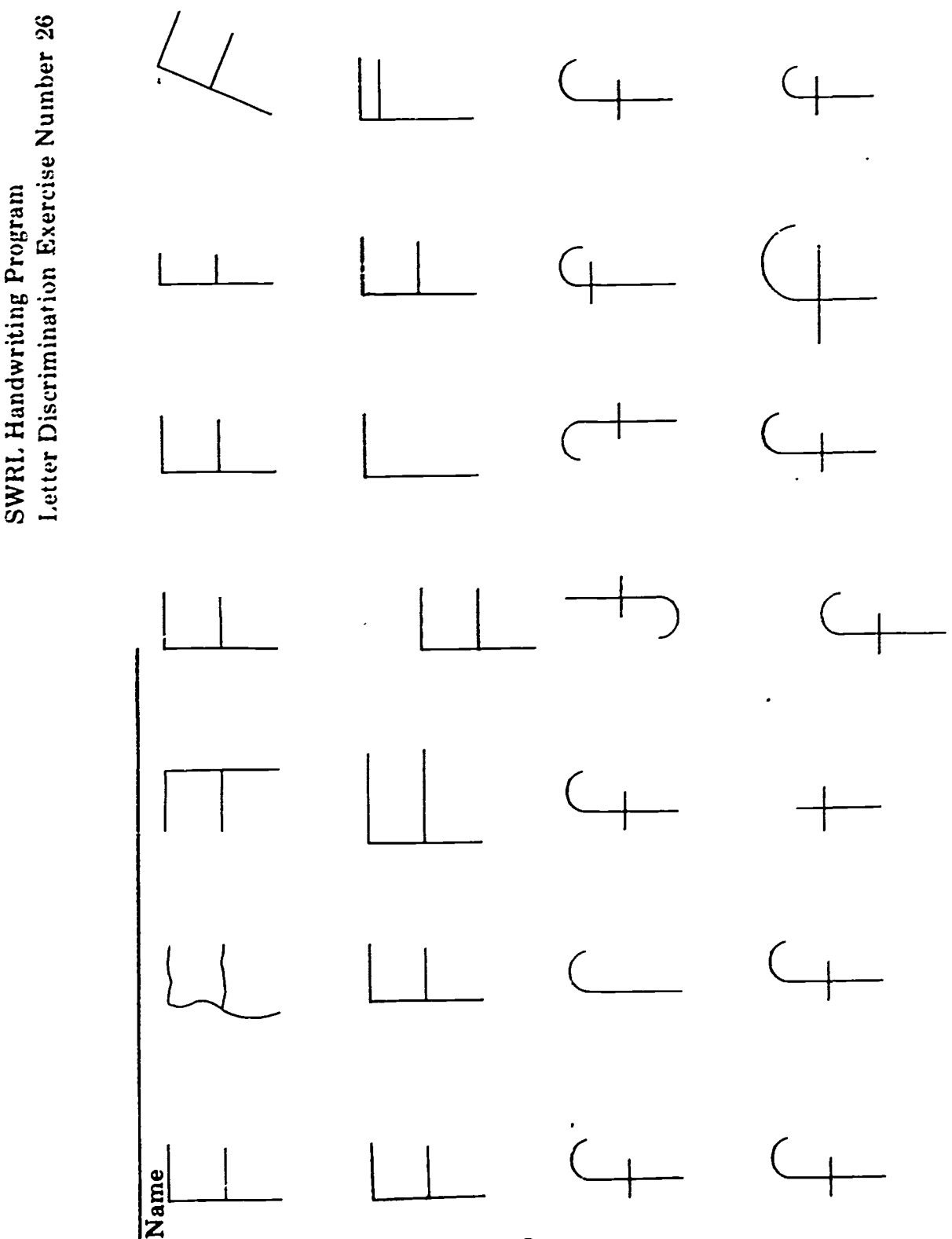


Figure 3

Sample Letter Discrimination Exercise.

(Reduced)



METHOD

SUBJECTS

Four kindergarten classes at an inner-city elementary school participated in the study. The classes were using the SWRL First Year Communication Skills Program, hence, the children were learning to name the letters of the alphabet. Prior to the study, three of the teachers reported giving the children normal kindergarten handwriting instruction on an informal basis. One of the teachers, however, claimed to be providing formal, systematic handwriting instruction. This class did not receive any SWRL handwriting instruction, but was tested and used for comparison purposes

DEPENDENT MEASURES

Two tests were constructed for pre-instruction and post-instruction assessment. The first test was a 24-item letter formation test which required Ss to copy both upper and lower case letters. Four types of letters were represented in the test: (1) letters composed of horizontal and/or vertical strokes, (2) letters composed of slanted strokes alone or in conjunction with other straight line strokes, (3) letters that consist of curved strokes, and (4) letters that have strokes consisting of curves merging with straight lines. (This test is contained in Appendix A.)

The second test was designed to assess how adequately Ss discriminated between correct and incorrect letter forms. It resembled the previously described letter discrimination exercises. All but one of the twelve items contained one correct alternative. The remaining item contained two correct alternatives. Just as with the discrimination exercises, Ss were required to circle the correct alternative(s). (This test is contained in Appendix B.)

PROCEDURE

Approximately 80 children from the four kindergarten classes were pretested with both tests approximately a week before instruction began. Then 60 children from three of the four classes were randomly assigned to the four treatment groups in such a way that an equal number of children from each class was assigned to each group. These groups were: Copying Only (CO), Copying plus Discrimination (C+D), Faded Tracing Only (FTO), and Faded Tracing plus Discrimination (FT+D). This arrangement constituted a 2x2 factorial design with the two types of letter formation practice (copying and faded tracing) crossed with the presence and absence of discrimination training. The previously described fourth class was used only for comparison purposes. Consequently it received only the handwriting instruction normally provided by the teacher.

Instruction began in March and occurred four days a week, for ten weeks. Each instructional session lasted 20 to 25 minutes, depending on the presence or absence of discrimination training. Two letters (often the upper- and lowercase versions of the same letter) were presented in each of the first three sessions. The fourth session was devoted to review. This pattern was occasionally interrupted by the insertion of extra review sessions. During the experiment, 23 uppercase and 22 lowercase letters were presented.

The two groups receiving discrimination training (C+D and FT+D) met in one room while the two non-discrimination groups (CO and FTO) met in an adjacent room. One of two SWRL staff members was assigned to each room as an experimenter/teacher. His job consisted of administering

directions to the Ss, supervising the teachers and aides assigned to help in each room, and providing individual feedback to Ss as they were completing their exercises. All adults participating in the study as instructors were rotated between groups and rooms at one- and two-week intervals to counterbalance any potential teacher effects.

In both rooms, the SWRL representatives began each session by introducing the two letters scheduled for that day. Thereafter, the procedure varied in each room. For the Ss in the discrimination training groups, each student was required to complete a letter discrimination exercise before he was to begin working on the letter formation exercise appropriate to his treatment condition (copying or faded tracing). Letter discrimination exercises required only about five minutes, or less, for completion. In the room with the two non-discrimination groups, each S was required only to work on the appropriate letter formation exercise.

Initially, when separate instructions had to be provided to the faded tracing and the copying groups within each room, the SWRL representative was assigned to one group while a teacher was assigned to the other. Since each group was provided with a different letter formation exercise, and in the beginning, different verbal directions, the two groups were separated in each room. Individual assistance and feedback were provided by SWRL representatives, teachers, and aides. A copy of the guidelines given to the instructional staff is included in Appendix C.

At the conclusion of the experiment, all of the children were retested with both tests. It was decided to score the tests of only those children who had been present for at least two-thirds of the instructional sessions and who had been tested both before and after the experimental period.

This meant scoring two tests from each of 70 children, 51 from the four treatment groups and 19 from the comparison class.

The letter discrimination tests were scored by awarding one point for every item in which the S circled only the correct letter(s). Thus, the maximum score on this test was 12.

The letter formation tests were scored by two judges who used a 5-point rating scale (Appendix D) to assign a score to each printed letter. Both judges were former elementary school teachers. In order to minimize sources of scoring bias, the pretests and the posttests were combined and then divided into two stratified random samples, one sample to be scored by each of the two judges. Each sample contained approximately the same number of tests per treatment condition and exactly the same number of pretests and posttests. Each S was represented in only one sample by both his pretest and posttest. Then the tests were stripped of all identifying marks, numbered, and shuffled.

Before each set of tests was presented to a judge for scoring, both judges rated a sample of 12 randomly selected tests to establish an interjudge reliability coefficient. The combination of high reliability ($r = .89$ on an item-by-item basis) and nonsignificant difference between their means ($\bar{X} = 2.07$, $\bar{Y} = 2.19$, $df = 574$, $t = .135$, n.s.) provided enough evidence to permit each judge to rate half of the remaining tests independently. In addition, after scoring all tests, it was found that the mean ratings assigned to the two randomized samples by the two judges were almost identical, $\bar{X} = 2.70$ and $\bar{Y} = 2.74$. The child's total score for the letter formation test was calculated by summing the ratings on all 24 items. Thus, the range of possible scores was from 24 (24 X rating of 1) to 120 (24 X rating of 5).

RESULTS

PERFORMANCE ON LETTER FORMATION TEST

Mean total scores, standard deviations, and mean ratings for both pretest and posttest administrations of the letter formation test for all groups are reported in Table .. ction of Table 1 discloses several patterns: (1) pretest mean ratings of the four experimental groups are almost identical (range from 2.3 to 2.4), (2) pretest to posttest mean rating gains for the four experimental groups range from at least half a point to almost a full point (on the 5-point rating scale) with both copying groups exhibiting higher posttest ratings than the two faded tracing groups, (3) the mean pretest rating of the comparison class is considerably higher than those of the four experimental groups, and (4) the mean rating gain of the comparison class was only 0.1 of a point.

Several statistical analyses were performed on the data in Table 1. First, a two-way ANOVA was conducted on the total posttest scores of the four experimental groups. The results of this analysis are contained in Table 2. A significant main effect was found in favor of the copying treatments over the faded tracing treatments. The second main effect analyzed, discrimination training, was not significant. Nor was there a significant interaction between discrimination training and faded tracing versus copying.

To compare each of the experimental treatment conditions with the non-SWRL instructed comparison class, a one-way ANACOVA was performed on the total posttest scores with the pretest scores serving as the

TABLE 1

MEAN TOTAL SCORES, STANDARD DEVIATIONS, AND MEAN RATINGS ON THE 24-ITEM LETTER FORMATION TEST

Group	*n*	Letter Formation Test					
		Pretest			Posttest		
		Mean Total	Standard Deviation	Mean Rating	Mean Total	Standard Deviation	Mean Rating
Experimental Groups							
CO	12	56.17	13.60	2.3	75.83	10.56	3.2
C+D	13	56.62	11.57	2.4	74.31	10.88	3.1
FTO	12	54.33	13.69	2.3	66.08	11.81	2.8
FT+D	14	54.43	12.75	2.3	69.14	12.25	2.9
Comparison Class	19	64.84	11.27	2.7	67.05	12.09	2.8

TABLE 2

TWO WAY ANALYSIS OF VARIANCE (FOR UNEQUAL CELL FREQUENCIES USING UNWEIGHTED CELL MEAN SOLUTION) ON LETTER FORMATION POSTTEST

Sources of Variation	*df*	Sum of Squares	Mean Square	F
A (Type of practice)	1	706.30811	706.30811	5.41085*
B (Discrimination)	1	7.63845	7.63845	0.05852
AB	1	66.46440	66.46440	0.50917
S/AB (adj.)	47	6135.16797	130.53548	

* Significant at the .025 level.

concomitant variable. This analysis was performed to compensate for the unequal pretest means which resulted from the inability to assign the comparison group randomly. A significant difference between the five groups was discovered (Table 3), and thus a Newman-Keuls test of multiple comparisons was subsequently performed on the adjusted means (Table 4). This analysis revealed that all four experimental groups differed significantly from the comparison class and that the Faded Tracing Only Group differed significantly from the Copying Only Group.

PERFORMANCE ON LETTER DISCRIMINATION TESTS

Mean scores and standard deviations for both administrations of the letter discrimination test for all treatment groups are reported in Table 5. An examination of the table reveals that: (1) mean pretest scores varied considerably, (2) all groups made substantial gains, with the average gain of the discrimination training groups (4.76 items) larger than the average gain of the non-discrimination training groups (3.38), and (3) both discrimination training groups acheived mean posttest scores above an 80% criterion (9.6) while the other two groups did not.

A two-way ANOVA was performed on the posttest scores. Table 6, which summarizes that analysis, reveals that a significant main effect was found favoring the groups which received discrimination training over those which did not. The F-value (4.03) representing the other main effect, the nature of the stimulus, fell just short of the value needed for significance (4.05, $p < .05$).

TABLE 3

ANALYSIS OF COVARIANCE ON POSTTEST SCORES
USING PRETEST SCORES AS COVARIATES

Source of Variation	*df*	SS'	MS	F
Treatment Combination	4	2070.8984	517.7246	9.463*
S/TC (adj.)	64	3501.4023	54.7094	
Total	68	5572.3008		

* Significant at the .01 level.

TABLE 4

NEWMAN KEULS TESTS ON ALL ORDERED PAIRS OF ADJUSTED MEANS

Treatments in Order of Adjusted Means	Comparison Group	Faded Tracing	Faded Tracing + Disc. Train.	Copying +D.T.	Copying
Adjusted Means	62.07	68.69	71.68	75.27	77.12
Difference Matrix					
	Comp Gp -	6.62*	9.61*	13.20*	15.05*
	FTO	-	2.99	6.58	8.43*
	FT+D		-	3.59	5.44
	C+D			-	1.85
	CO				-
Truncated range r					
$q_{.95}(r, 64)$		2.83	3.40	3.74	3.98
$q_{.95}(r, 64)\sqrt{MS'_{error\ (effective)}/n}$		5.68	6.83	7.51	7.99

*Significant at the .05 level.

TABLE 5

MEAN SCORES AND STANDARD DEVIATIONS ON THE 12-ITEM LETTER DISCRIMINATION TEST ADMINISTERED BEFORE AND AFTER INSTRUCTION

Group	*n*	Letter Discrimination Test					
		Pre			Post		
		Mean	S.D.	%	Mean	S.D.	%
1 Copying	12	5.17	3.19	43	9.25	1.96	77
2 Faded Tracing	12	3.58	2.31	30	6.25	3.33	52
3 Copying with Discrimination Training	13	4.69	3.84	39	9.85	2.85	82
4 Faded Tracing with Discrim. Training	14	5.36	3.46	45	9.71	2.79	81

TABLE 6

TWO WAY ANALYSIS OF VARIANCE (FOR UNEQUAL CELL FREQUENCIES USING UNWEIGHTED CELL MEAN SOLUTION) ON LETTER DISCRIMINATION POSTTEST

Sources of Variation	*df*	Sum of Squares	Mean Square	F
A (Type of practice)	1	31.13658	31.13658	4.03
B (Discrimination)	1	52.33762	52.33762	6.78*
AB (Interaction)	1	26.11765	26.11765	3.38
S/AB (adj.)	47	363.04956	7.72446	

* Significant at the .05 level

Since letter discrimination skill appeared to be unevenly distributed throughout the four experimental groups, a two-way ANACOVA was performed on the posttest scores using the pretest scores as the covariate. This analysis, reported in Table 7, supports the results of the ANOVA. The only significant F-value (6.13) favored the discrimination training groups. (Mean squares and sums of squares are not reported in Table 7 because the computer program which performed this analysis, BMD05V, employs a multiple regression technique.)

ADDITIONAL ANALYSES

In addition to the above analyses, t-tests were performed on the letter formation posttest scores with respect to handedness and sex of subjects. In both cases no significant differences were found. A summary of those analyses is included in Table 8.

Finally, to determine the relative difficulty of each letter in the letter formation test, means and standard deviations were computed on a letter by letter basis, using scores from all of the tests. Table 9 ranks the letters from easiest to most difficult.

TABLE 7

TWO WAY ANALYSIS OF COVARIANCE (USING MULTIPLE REGRESSION TECHNIQUE) ON LETTER DISCRIMINATION POSTTEST SCORES USING PRETEST SCORES AS COVARIATES

Sources of Variation	*df*	F
A (Type of practice)	1,46	3.73
B (Discrimination)	1,46	6.13*
AB (Interaction)	1,46	2.13

* Significant at the .05 level.

TABLE 8

t - TESTS COMPARING LETTER FORMATION POSTTEST MEANS WITH RESPECT TO SEX AND HANDEDNESS

	Variable	*n*	Mean	S.D.	*t*	*df*	*p*
Sex	boys	23	70.61	12.95	0.39	49	0.70
	girls	28	71.89	10.85			
Handedness	left	13	68.54	13.49	0.99	49	0.33
	right	38	72.26	11.12			

TABLE 9

LETTERS RANKED IN TERMS OF RELATIVE PERFORMANCE ON BOTH ADMINISTRATIONS OF LETTER FORMATION TEST

Letter	Mean Rating
i	3.1579
L	3.1315
H	3.0592
I	2.9210
t	2.8815
E	2.8223
X	2.7829
A	2.7302
h	2.7302
K	2.6842
k	2.6250
f	2.6052
J	2.5855
W	2.5592
m	2.5329
Q	2.5065
S	2.4868
R	2.4605
P	2.3684
N	2.3355
e	2.3223
d	2.3092
g	2.2697
U	2.1513

DISCUSSION

The purpose of this study was to provide information that would be useful in developing a teacher-administered, primary grade manuscript handwriting program. Several of the outcomes of this study lend themselves to this purpose and are discussed below according tc treatments.

COPYING VS. FADED TRACING

Contrary to the anticipated outcome, subjects who formed letters solely in response to copying stimuli performed significantly better on the letter formation posttest than subjects who formed letters in response to copying stimuli and gradually faded tracing prompts. Examinations of the weekly review exercises which were collected, and observations of subjects working on the faded tracing exercises revealed several phenomena which may help to explain this particular outcome: (1) When the tracing prompts were still intact at the beginning of an exercise, some subjects connected the dots representing each stroke with a series of short, discontinuous marks. They thereby failed to gain the appropriate practice of making continuous strokes. (2) With the gradual elimination of dots, from those in the last stroke to those in the first stroke, some subjects ended their letters at the last remaining dot, forgetting, or perhaps not understanding, that they were supposed to complete the letter on their own. (3) Once a significant number of dots had been faded from certain multi-stroke letters, some subjects became confused. They drew lines connecting the wrong dots to each other which resulted in severely malformed letters. Since treatment groups were too large to allow for the provision of timely

feedback, a child might have practiced the same error 10 or 15 times before being corrected.

It should be noted that all four treatment groups made significant gains in their ability to print letters. This suggests that a regimen of frequently administered letter formation exercises is likely to benefit children of kindergarten age. It does not mean, however, that every kind of letter formation exercise will serve equally well. The two kinds of letter formation exercises administered to subjects in this study did affect their performance differentially. Nor does it mean that teachers without systematically developed and structured materials will be able to achieve similar results when left to their own devices. The fact that the comparison class, which was supposed to have been receiving some form of teacher-administered handwriting instruction, did not improve significantly during the experimental period attests to that.

DISCRIMINATION TRAINING

Subjects who received letter discrimination exercises learned to discriminate between correct and incorrect letter forms. Their performance on a test of that ability at the end of the experimental period exceeded an 80 percent criterion. They performed significantly better on this test than subjects who did not receive those same exercises during the experimental period. Nevertheless, they did no better on the letter formation posttest than subjects who did not receive letter discrimination training. Thus, discrimination training of this

type does not appear to be an effective treatment for promoting correct letter formation behavior.[1]

RECOMMENDATIONS FOR PROGRAM DEVELOPMENT

The following recommendations are offered in the hope that their consideration and implementation will result in the development of more effective handwriting materials. The first two recommendations refer to the independent variables investigated in this study. The others deal with peripheral issues and are based mainly on the observations and impressions of the authors.

1. Further research is required to determine whether or not there is some combination of tracing prompt and fading strategy more effective than that used in this study. Examples of tracing prompts include: (1) dotted letter patterns, (2) dashed letter patterns, (3) letters consisting of thick, shaded strokes, (4) shapes which, when outlined, form letters.

   Examples of fading strategies include: (1) gradually reducing the darkness of the prompt, (2) gradually eliminating the prompt, beginning with the section formed last, (3) gradually eliminating the prompt, starting with the section formed first, (4) gradually eliminating the prompt, beginning with the middle section and working toward both ends simultaneously, (5) gradually reducing the number of complete prompts appearing in each successive row by alternating complete prompts with ever increasing numbers of blank response positions.

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[1] It is interesting to note that similar results regarding discrimination training were obtained in another Laboratory study. Children who received auditory discrimination training plus articulation practice on the /th/ phoneme scored higher on a discrimination posttest but failed to actually articulate /th/ any better than children who received only articulation training. See Gilbert and Niedermeyer (1971).

2. The type of letter discrimination training dealt with in this study does not appear to enhance letter formation performance and should not be a part of the kindergarten writing program. It is possible, however, that training a child to match his own writing with standard letter forms may be useful but this was not studied.

3. It was necessary for the judges used in this study to evaluate, discuss, and re-evaluate a sample of letter formation tests before they could use the subjective rating scale reliably. Teachers will need a simpler procedure to evaluate their students' criterion exercises. Therefore, it is recommended that they be provided with a rating guide consisting of sample letters representing each of the points on the rating scale. Ideally, teachers would be trained to use this guide during their initial orientation to the program.

4. Instructional materials and procedures which foster a positive attitude toward a task are more likely to be effective than those which do not. Therefore, in order to measure the attitudinal impact of components to the handwriting program, it is recommended that an instrument be developed which can be used to assess students' willingness to engage in handwriting activities.

5. Regardless of the means used to elicit responses, a technique must be devised which will provide students with adequate feedback. Such feedback should serve to reinforce correct responses and to extinguish incorrect responses. In this experiment, there were usually two instructors for every 15 subjects. Even with a teacher-pupil ratio this low, it was difficult to provide feedback as needed. In order for teacher-mediated feedback to be timely, instruction should be provided to no more than five or six students at a time. Otherwise students are likely to make many incorrect responses before they receive feedback. Alternate feedback techniques, likely to be more effective than teacher-mediated feedback, include: (1) immediate feedback provided through the use of special marker[2] in conjunction with chemically treated paper and (2) delayed feedback provided by means of transparent overlays containing translucent letter forms.

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[2] There is already one handwriting program on the market which employs such a device, Lyons & Carnahan's Handwriting with Wrie and See, produced under the direction of B.F. Skinner.

6. The letter forms used in this experiment were drawn from the materials adopted for use in the state of California (Noble and Noble, 1967). This was done to facilitate the subjects' use of those materials in the first grade. Unfortunately the letter forms used in the state series present unnecessary challenges to the motor skill of young children. Some letters contain strokes which needlessly merge a straight line with a curve. Such strokes should be avoided whenever possible because they are among the most difficult to form. (See Table 9.) Other letters contain either a perfect circle or an arc from a perfect circle where a more easily formed oval shape would suffice. In addition, the state series' guidelines for stroke sequence and direction seem to reflect the needs of draftsmen rather than young children. They do not always follow a left-to-right progression, nor do they appear to facilitate transfer to cursive writing. The next version of SWRL's handwriting program should be based on an alphabet designed to expedite letter formation quality, letter formation speed, and transfer to cursive writing.

7. The present study gave equal amounts of practice to each letter. Since some letters are more difficult to form than others, the handwriting program should be designed so that those differences are reflected in: (1) the number of responses required in each letter formation exercise, (2) the sequence of letter presentation, and (3) the amount of letter formation review required for each letter.

8. In this study, letters were introduced by drawing them on the chalkboard at the beginning of, or during, each lesson. This proved to be quite inconvenient. It was time-consuming and the letters were not always drawn properly. Therefore, it is recommended that teachers be provided with flashcard- or poster-size letters, complete with numbers and arrows indicating stroke sequence and direction.

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APPENDIX A

LETTER FORMATION TEST

(Reduced)

Test P.1

Letter Formation

SWRL Handwriting Program

Name _____

APPENDIX A

LETTER FORMATION TEST

(Reduced)

Test P.2

Letter Formation

SWRL Handwriting Program

APPENDIX A

LETTER FORMATION TEST

(Reduced)

Test P.3

Letter Formation

SWRL Handwriting Program

APPENDIX B

LETTER DISCRIMINATION TEST

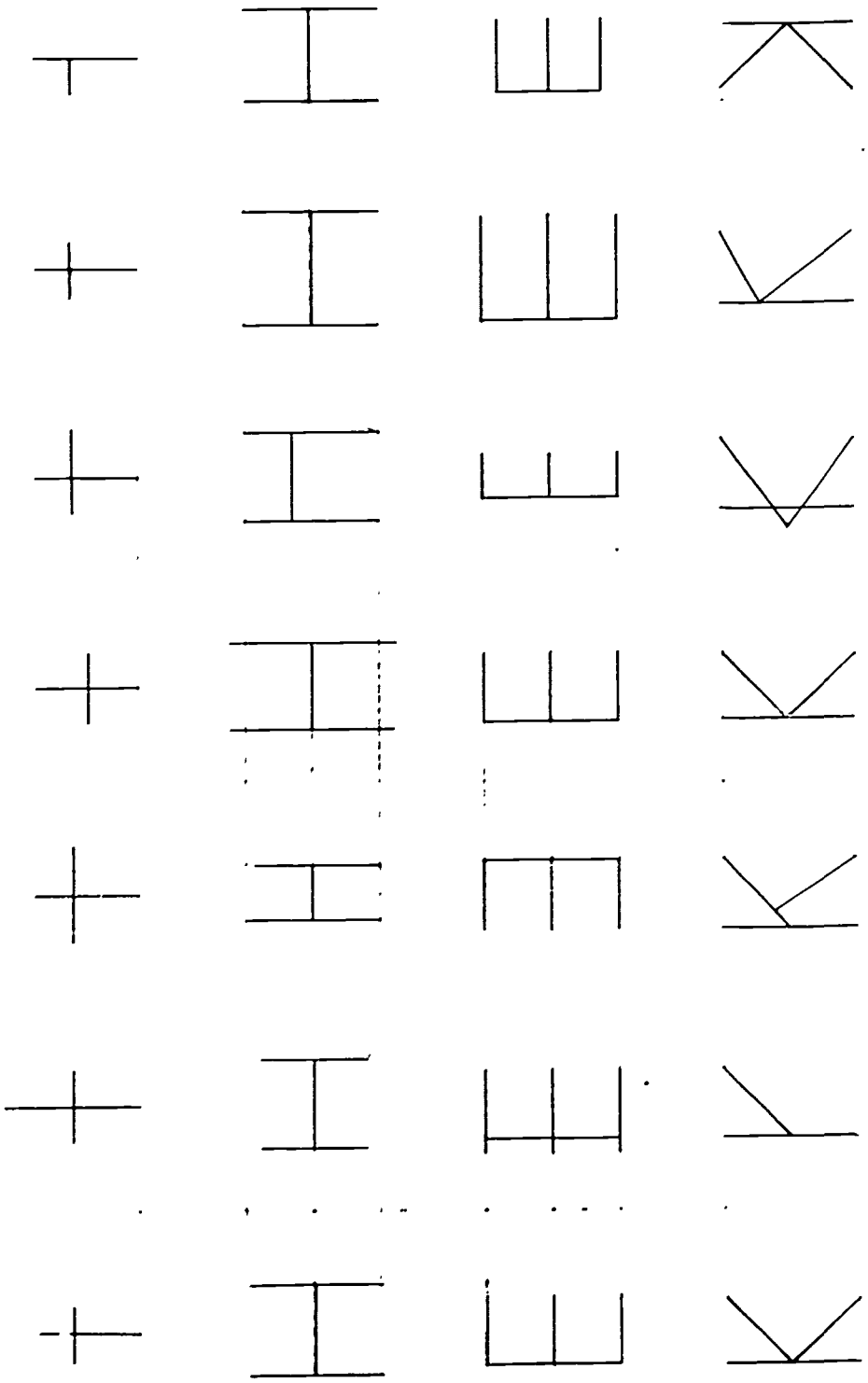
(Reduced)

Test P. 1

Letter Discrimination

SWRL Handwriting Program

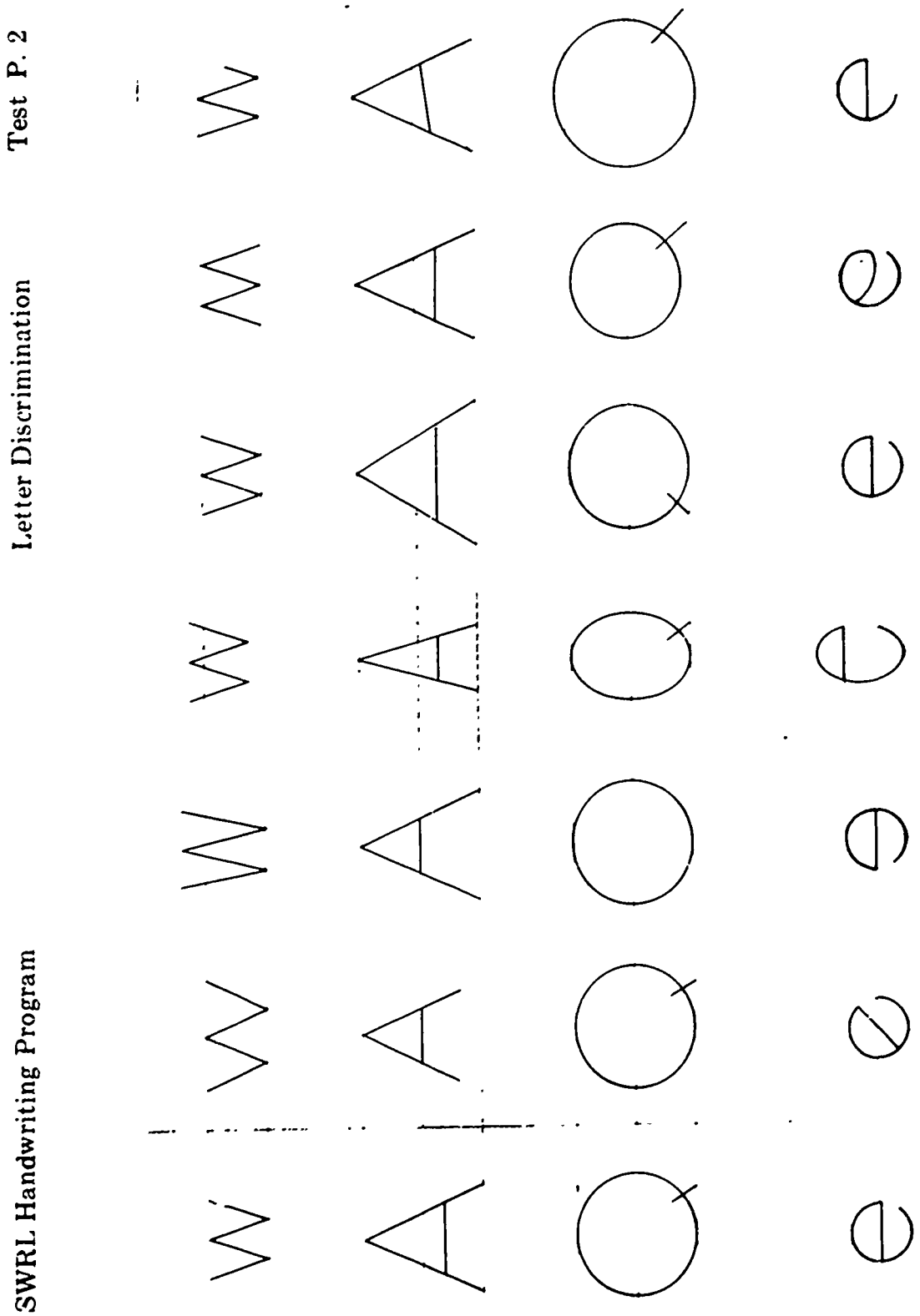
Name _____



APPENDIX B

LETTER DISCRIMINATION TEST

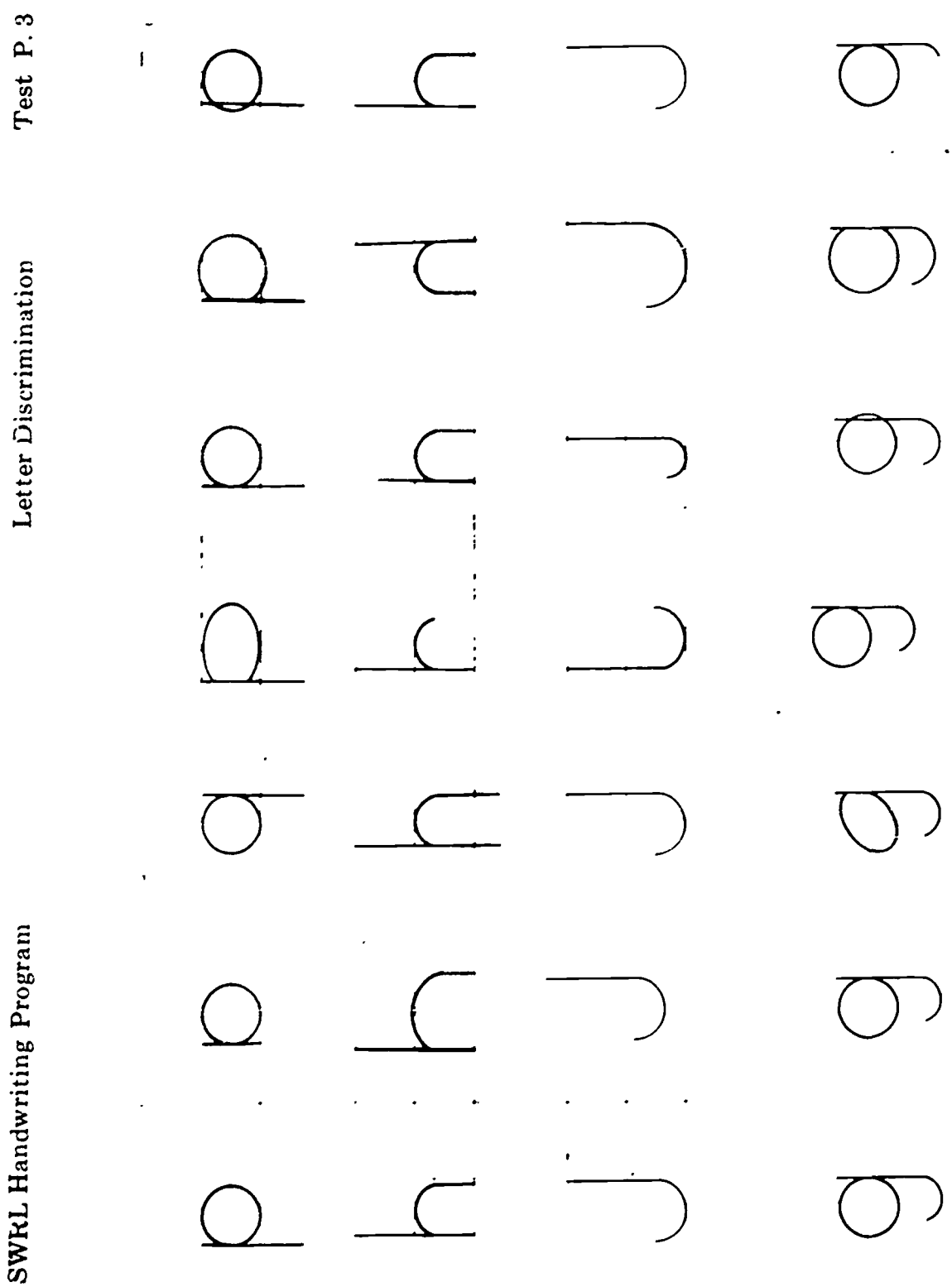
(Reduced)



APPENDIX B

LETTER DISCRIMINATION TEST

(Reduced)



APPENDIX C

GUIDELINES FOR INSTRUCTIONAL STAFF

Assignments for Week_____

	Group 1 (Yellow)	Group 2 (Blue)	Group 3 (Orange)	Group 4 (Green)
Initial Instruction				
Group Follow-up				
Individual Feedback and assistance				

(Those listed at each level are also responsible for assuming the duties of the level(s) below their names.)

NATURE OF RESPONSIBILITY

Initial Instruction

This person (one in each room) introduces any new terms, concepts, strokes, and letters using the chalkboard and any devices or charts which might clarify the new material. He addresses himself to all of the children in the room. A SWRL staff member will usually assume this responsibility. Staff members will rotate from one room to the other every two weeks.

Group Follow-up

These people (two in each room) provide directions specific to either the "tracing" or copying group. Each stands at the appropriate side of the room so that the two groups are facing away from each other.

(1) Tracing instruction should emphasize the necessity of making every stroke in the right order and direction even though dot patterns are gradually faded until the student is virtually copying the letter. Students should be encouraged to check each letter they make with the model at the end of the line. A chart with representative dot patterns should be used to illustrate the procedure.

(2) Copying instruction should emphasize placing the pencil point on the starting dot, making the first stroke in the correct direction, and completing the letter with strokes made in proper sequence and direction. Students should be encouraged to compare their letters with the model and to correct any that differ radically from it. The last line on each sheet should contain a copied letter under each letter from the previous line (six letters in all). A chart with starting dots and well-formed letters should help illustrate the procedure.

Individual Feedback and Assistance

These people (four in each room) are responsible for assisting students as they work on the exercises. They should praise students for every bit of good work, encourage the speedy but careless to slow down and concentrate on quality, encourage the very slow to increase their pace, point out errors and urge students to correct them, and, as a last resort, physically help students with the task. It is imperative that as many students be seen as is possible in such a short period of time. The most blatant errors should be corrected first. More subtle errors can be corrected during review sessions.

APPENDIX D

LETTER EVALUATION GUIDE

Evaluating the quality of letters the children make involves subjective judgements about the appropriateness of the shape of the letter, its size (in terms of both height and width), its orientation (whether it rests on the base line, is not tilted, and is not reversed or inverted) and the line quality (whether lines are steady). The following five-point legibility scale will help you to determine the degree to which the child needs further instruction and/or practice. For letters on which the child receives a rating of three or less, additional letter formation practice should always be provided.

RATING		MEANING
5	Very legible:	Letter matches model. No further practice is required.
4	Quite legible:	Letter closely approximates model's size and shape. Some additional practice may be desirable.
3	Fairly legible:	Letter deviates somewhat from model's size and shape. Additional practice is necessary.
2	Barely legible:	Letter's size and shape deviate markedly from model, or letter is reversed or inverted. Substantial instruction and practice is necessary.
1	Completely illegible or no response:	Letter in no way approximates model. Repeat entire letter formation instructional sequence (Letter Formation Exercises, Practice Exercises, Copying and Oral Exercises) with the child individually.